UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/559,903	04/26/2000	Zhiping Yin	MI22-1427	1798

21567 7590 05/24/2002

WELLS ST. JOHN P.S.
601 W. FIRST
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER
ECKERT II, GEORGE C

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 05/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/559,903	Yin et al.
Examiner	**Art Unit**
George C. Eckert II	2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jan 22, 2002*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *23-35* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *23-35* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *Apr 26, 2000* is/are a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). *7 & 8*
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. Applicant's amendment dated January 22, 2002 in which claims 32-35 were newly added has been placed of record in the file.

2. The declaration filed on January 22, 2002 under 37 CFR 1.131 has been considered but is ineffective to overcome the Yao et al. reference. The declaration must be signed by all listed inventors or fewer than all listed inventors if it is shown that less than all named inventors invented the subject matter of the claims under rejection. The declaration filed January 22, 2002 is only signed by the first named inventor, Zhiping Yin. However, there has been no showing that the subject matter of the claims under rejection (claims 23-31) was invented only by Zhiping Yin. Nor has there been a showing under 37 C.F.R. §§ 1.42, 1.43 or 1.47 that the remaining inventors are unavailable for any of the various reasons. As such, the declaration is ineffective.

Specification

3. The objections to the specification are withdrawn based on applicant's amendment.

Claim Rejections - 35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 23-25, 27 and 29-33 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,133,613 to Yao et al. With regard to claims 23-25, 27 and 29-31, Yao et al. teach, with reference to figure 5 and column 4, lines 13- a gate stack circuitry comprising:

a semiconductive substrate 502;

a polysilicon layer 504 over the substrate;

a metal silicide layer 506 over the polysilicon and thus over the substrate;

a substantially inorganic layer 508 comprising silicon, nitrogen and oxygen over and in physical contact with the metal silicide layer; and

a silicon nitride layer 510 over and in physical contact with the layer comprising silicon, oxygen and nitrogen.

With regard to claims 32 and 33, Yao et al. teach that the substantially inorganic layer 508 comprising silicon, nitrogen and oxygen is between 150 - 850 Å thick (col. 4, lines 16-18).

5. Claims 23-25, 27 and 29-33 are rejected under 35 U.S.C. 102(e) as being anticipated by US 5,994,730 to Shrivastava et al. (of record). With regard to claims 23-25, 27 and 29-33, Shrivastava et al. teach, with reference to figure 2a, gate stack circuitry comprising:

a semiconductive substrate 12 (col. 3, line 39);

a polysilicon layer 38 over the substrate (col. 4, line 56) ;

a metal silicide layer 40 over the polysilicon and thus over the substrate (col. 4, line 57);

a substantially inorganic layer 42 comprising silicon, nitrogen and oxygen over and in physical contact with the metal silicide layer (col. 5, lines 1-8); and

a silicon nitride layer 46 over and in physical contact with the layer comprising silicon, oxygen and nitrogen (col. 19-21).

With regard to claims 32 and 33, Shrivastava et al. teach that the substantially inorganic layer 42 comprising silicon, nitrogen and oxygen has a thickness of approximately 500 Å which is between 250 - 650 Å as claimed (col. 5, lines 3-4).

6. Claims 23-25, 27 and 29-31 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,482,894 to Havemann. With regard to claims 23-25, 27 and 29-33, Havemann teaches, with reference to figure 1d and the table in column 6, gate stack circuitry comprising:

a semiconductive substrate 20;

a polysilicon layer 26 over the substrate;

a metal silicide layer (not shown) over the polysilicon and thus over the substrate;

a substantially inorganic layer 28 comprising silicon, nitrogen and oxygen over and in physical contact with the metal silicide layer; and

a silicon nitride layer 30 over and in physical contact with the layer comprising silicon, oxygen and nitrogen.

Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 26, 28, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yao et al. in view of US 5,883,011 to Lin et al. (submitted by applicant). Yao et al. taught the device of claims 23 and 27 as discussed above including the limitations of claims 34 and 35 that the substantially inorganic layer comprising silicon, nitrogen and oxygen is between 250 and 650 Å thick. However, Yao et al. did not expressly disclose that the layer comprising silicon, nitrogen and oxygen comprises $Si_xN_yO_z$:H where x is from 0.39 to 0.65, y is from 0.02 to 0.56 and z is from 0.05 to 0.33. Lin et al. teaches, with reference to column 6, lines 4-24, a process in which $Si_xN_yO_z$ is formed over as an antireflective layer (note that the subscripts have been changed to mimic those used in the instant claims to make comparisons easier). Lin et al. teaches that x = 0.5 (which is in the range of 0.39 to 0.65), y = 0.12 (which is in the range of 0.02 to 0.56) and z = 0.3 (which is in the range of 0.05 to 0.33).

Yao et al. and Lin et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the ratios as taught by Lin et al. in the layer taught by Yao et al. The motivation for doing so, as is taught by Lin et al., is that such a ratio used in the $Si_xN_yO_z$ layer is well known in the art

when $Si_xN_yO_z$ is used as an antireflective layer (col. 4, lines 22-37). Therefore, it would have been obvious to combine Yao et al. with Lin et al. to obtain the invention of claims 26, 28, 34 and 35.

8. Claims 26, 28, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shrivastava et al. in view of Lin et al. (submitted by applicant). Shrivastava et al. taught the device of claims 23 and 27 as discussed above, including that the layer comprising silicon, nitrogen and oxygen is 250 - 650 Å thick. However, Shrivastava et al. did not expressly disclose that the layer comprising silicon, nitrogen and oxygen comprises $Si_xN_yO_z$:H where x is from 0.39 to 0.65, y is from 0.02 to 0.56 and z is from 0.05 to 0.33. Lin et al. teaches, with reference to column 6, lines 4-24, a process in which $Si_xN_yO_z$ is formed over as an antireflective layer (note that the subscripts have been changed to mimic those used in the instant claims to make comparisons easier). Lin et al. teaches that x = 0.5 (which is in the range of 0.39 to 0.65), y = 0.12 (which is in the range of 0.02 to 0.56) and z = 0.3 (which is in the range of 0.05 to 0.33).

Shrivastava et al. and Lin et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the ratios as taught by Lin et al. in the layer taught by Shrivastava et al. The motivation for doing so, as is taught by Lin et al., is that such a ratio used in the $Si_xN_yO_z$ layer is well known in the art when $Si_xN_yO_z$ is used as an antireflective layer (col. 4, lines 22-37). Therefore, it would have been obvious to combine Shrivastava et al. with Lin et al. to obtain the invention of claims 26, 28, 34 and 35.

9. Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Havemann in view of Lin et al. (submitted by applicant). Havemann taught the device of claims 23 and 27 as discussed above. However, Havemann did not expressly disclose that the layer comprising silicon, nitrogen and oxygen comprises $Si_xN_yO_z$:H where x is from 0.39 to 0.65, y is from 0.02 to 0.56 and z is from 0.05 to 0.33. Lin et al. teaches, with reference to column 6, lines 4-24, a process in which $Si_xN_yO_z$ is formed over as an antireflective layer (note that the subscripts have been changed to mimic those used in the instant claims to make comparisons easier). Lin et al. teaches that x = 0.5 (which is in the range of 0.39 to 0.65), y = 0.12 (which is in the range of 0.02 to 0.56) and z = 0.3 (which is in the range of 0.05 to 0.33).

Havemann and Lin et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the ratios as taught by Lin et al. in the layer taught by Havemann. The motivation for doing so, as is taught by Lin et al., is that such a ratio used in the $Si_xN_yO_z$ layer is well known in the art when $Si_xN_yO_z$ is used as an antireflective layer (col. 4, lines 22-37). Therefore, it would have been obvious to combine Havemann with Lin et al. to obtain the invention of claims 26 and 28.

Response to Arguments

10. Applicant's arguments with respect to claims 23-31 have been considered but are moot in view of the new grounds of rejection as well as the ineffective declaration.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Stoll et al is provided for showing that a silicon oxynitride layer has a variable stoichiometry (col. 2, line 44).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Eckert II whose telephone number is (703) 305-2752.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Eddie Lee can be reached on (703) 308-1690. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

GEORGE C. ECKERT II
PATENT EXAMINER

GCE
May 20, 2002